followed the use of immune serum. In all cases treated with serum Type I agglutinins can be demonstrated in the patient's blood two to three minutes after the administration of 75 to 100 c.c. of serum. With the rise of the agglutinating power the temperature curve falls. Serum treatment must be active at the start. It is important to give large doses of immune serum at the beginning of the treatment. Studies of agglutination curves in the cases of Type I infection do not give definite proof that the effect of immune serum is limited by the presence of soluble substances in the blood.

Further Studies on the Epidemiology of Lobar Pneumonia.—Stillmann (*Jour. Exp. Med.*, 1917, xxvi, 513). Pneumococci of Type I and Type II are responsible for the majority of the cases of lobar pneumonia while those of Type III and Type IV produce the rest of the cases. Among the pneumococci found in the mouths of healthy individuals Type IV predominated, Type III is frequent and atypical organisms of Type II are occasionally found. Healthy persons intimately associated with cases of lobar pneumonia may harbor in their mouth secretions the highly parasitic pneumococcus of Type I and II. The time interval involved in this association is a variable quantity. In the majority of contact carriers the organism isolated from the mouth corresponds strictly to the type of organism found in the infective cases. Occasionally a carrier of Type I or Type II pneumococcus is encountered in whom it is impossible to trace any contact with an infected patient. From the dust of homes where cases of pneumonia due to Types I and II have occurred, pneumococci of the same type may be recovered. Air-borne infection may play a part in the production of pneumonia. The mere presence of disease-producing pneumococci in the mouth will not initiate infection, susceptibility of the individual being a prerequisite.

HYGIENE AND PUBLIC HEALTH

UNDER THE CHARGE OF

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Study of Diphtheria Carriers.—Lewis (*Boston Med. and Surg. Jour.*, May 2, 1918, p. 602) states that there are two factors which should make this subject timely: (1) the unappreciated known fact that measles is followed by diphtheria; (2) that a so-called experiment based on certain knowledge of the first factor has given rational results as well as demonstrating what should be the simplicity of control of the disease. From his studies Lewis concludes that the continuous search for carriers in controlling diphtheria is an exact sanitary measure of prevention. All individuals with acute catarrhal nasal conditions are the potential acute nasal diphtheria carriers; it requires the presence of a chronic carrier, generally also nasal in type. The permanency of the former when made a carrier is dependent on the degree of nasal obstruction. All individuals convalescent from any respiratory disease, however mild, constitute the largest proportion of nasal carriers of diphtheria. Investigation of all such individuals and their isolation, if carriers, is the essential basis of control of diphtheria. In general, cases follow the production of acute nasal carriers by chronic ones. Responsibility for any frequency of the disease is solely that of health authorities.

Are All the Tubercle Bacilli Found in the Sputum Virulent?—CORPER (*Jour. Am. Med. Assn.*, May 4, 1918, p. 1281) states that it was deemed advisable to investigate the problem of the virulence of tubercle bacilli in the sputum of consumptives on account of the lack of conclusive available data and the tremendous importance of this information for the institution of hygienic measures in preventing and eradicating the disease. His investigations revealed that in the majority of open cases of pulmonary tuberculosis the tubercle bacilli which could be isolated on artificial mediums from the sputum were virulent enough to produce systemic tuberculosis in guinea-pigs by means of doses as small as 0.000001 mg., and that the range of variation was very small, as was also pointed out by Gilbert and Gregg, who found it to lie between 10 and 120 bacilli. The author further states that if the virulence of the bacilli as cultivated on artificial mediums is a direct expression of their virulence in the sputum there is only one conclusion to be drawn from the foregoing findings, as viewed from a practical stand-point, and that is, that in open cases of pulmonary tuberculosis the tubercle bacilli discharged by droplet or by expectoration, when still uninfluenced by drying and light, are a danger to mankind through direct transmission at least. In applying these findings to mankind there was found in the literature only one reference which would indicate the relation between the number of bacilli of the same culture necessary to infect a guinea-pig and to infect man. These observations were made by Webb and Gilbert, who found that a culture of human tubercle bacilli sufficiently virulent to infect a guinea-pig when ten bacilli were used was also capable of infecting a child in practically the same dose. It seems justifiable therefore to conclude that the tubercle bacilli found in the sputum of patients in open cases of pulmonary tuberculosis (provided the bacilli capable of artificial cultivation are a true index of those existing in the native sputum) vary only slightly in virulence for guinea-pigs, and are for practical purposes nearly all pathogenic. That is, in 97 per cent. of the cases they will infect a child, as may be deduced from Webb and Gilbert's observations, in a dose of less than one-millionth milligram. These experiments also seem to lay special emphasis on the examination of the sputum of men in military service or about to enter it.

Meningococcus Carriers: Preliminary Report from First Naval District.—REDDEN (*Boston Med. and Surg. Jour.*, May 9, 1918) states that meningococcus carriers in this district have been isolated on the basis of agglutinations in $\frac{1}{10}$ or $\frac{1}{50}$ dilutions of polyvalent antimeningococcus sera on slides, followed by gross agglutinations in tubes, the final readings being taken after twelve hours in the incubator at 55° C. and twelve hours in the ice-box. This has been supplemented by a careful study of cultural characteristics. Over three thousand cultures have been examined, of which about three hundred have been positive for meningococci. Of this group about 40 per cent. agglutinated specifically in $\frac{1}{10}$ antimeningococcus serum, and about 60 per cent. as high as the $\frac{1}{50}$ dilution on the slide. Experience has shown that results of gross agglutination in tubes rarely alters the positive findings obtained on slides. Repeated examinations of a group of 100 carriers showed that only 16 per cent. were ready for discharge at the end of the minimal isolation period of two days; that 7 per cent. remained positive over forty days; that 6 per cent. showed positive cultures after three successive negatives; that 49 per cent. showed positive cultures after one or more negatives, thus demonstrating a persistent and an intermittent type of carrier; that a carrier may show a pure culture of meningococci on one examination, on the next only a few scattered colonies in a mixed culture and on the third a pure culture of meningococci. Treatment has been of no value in our hands. A sharp decline in the number of positive cultures from the carrier group has been noted durng the past two weeks of warm weather. A study of 13 groups of so-called "contacts" and 6 groups of "non-contacts" brings out the following facts: Under good hygienic conditions, groups of naval men in this district, if only moderately well selected on the basis of possible contact with a known case of cerebrospinal fever, show from 6 to 8 per cent. carriers. If hygienic conditions are poor, that is, if men are in crowded quarters, are subjected to severe physical labor under extremes of heat and cold, such groups may show from 17 to 22 per cent. carriers. Among groups of naval men well selected on the basis of possible contact with a known case of cerebrospinal fever and living in close contact with each other either on shipboard or in crowded quarters 20 to 35 per cent. appear to be carriers, the upper limit representing the most carefully chosen group. But when only a small group of guards isolated from the rest of a crew is considered only 11 per cent. appear positive. One group of 100 men taken at random from a camp where there had been no case of cerebrospinal fever, and where living conditions are excellent, showed 9 per cent. carriers as contrasted with 26 per cent., which appeared in a group of 100 taken from barracks where men were decidedly overcrowded and from which a number of cases had been taken, also, where 20 to 25 per cent. carriers had been found on previous examinations. Another non-contact group of 79 men, representing a naval student body living in barracks under good hygienic conditions, showed 9 per cent. as contrasted with the 1 per cent. found among 100 women students of Simmons College and the 1 per cent. found among the first and second-year Harvard medical students. In these last three groups about all the factors were common, but the naval group ate at a common mess and lived in barracks, whereas the others lived chiefly at home or in small groups. Hence it is evident that the important factors which change the number of carriers from as low as 1 to 2 per cent. among civilians to as high as 20 to 35 per cent. among recruits are: contact with known cases of cerebrospinal fever; unhygienic conditions such as come from crowded barracks; severe physical labor, coupled with exposure to extremes of heat and cold; and, finally, contact with carriers of meningococci.

Increasing Mortality after the Age of Forty-five; Some Causes and Explanations.—DUBLIN (*Quarterly Publication of the American Statistical Association*, March, 1917) states that the apparent increase during recent years of the death-rate after the age of forty-five has caused many statisticians and health officers to fear that changes in conditions of life in this country have reduced the expectation of life at the higher age groups. He has shown on the basis of statistics for New York State that this fear is ungrounded and that the increase is in large measure, if not entirely, due to another factor that has been heretofore neglected, *i. e.*, to the effect of changes in the racial composition of the population. He shows that the proportion of the native born in each ten-year age period after forty-five has decreased in recent years and that, correspondingly, the proportion of the foreign stock at these age periods has increased. He then shows that without exception the death-rate in the older groups is higher among the foreign born and the native born of foreign parentage than among the native born. This means that in the older age groups of the population there has occurred in recent years "an increase in the proportion of those having higher death-rates and a corresponding decrease in the proportion of those having lower death-rates," a change which "must have had the effect of increasing the total death-rate" at these ages. The increase in the death-rate from cancer, Bright's disease, heart diseases, diabetes and the other so-called degenerative diseases that are largely responsible for the mortality after the age of forty-five is partly to be accounted for on similar grounds, since the death-rate from these causes is higher among the foreign than the native born. The increase in mortality from these diseases, however, is also partly to be accounted for by certain changes in the methods of certifying and tabulating causes of death in statistical offices, which have resulted in an increase in the published though not in the actual death-rates from these diseases. Americans today, according to the author, are not experiencing a shorter expectation of life after the age of forty-five than did Americans of a previous generation.

Flight of Mosquitoes.—LE PRINCE (*U. S. Public Health Reports*, May 4, 1917) states that in the Southern States Anopheles quadrimaculatus is probably the principal carrier of malaria. The extent to which Anopheles punctipennis or Anopheles crucians may transmit the disease has not yet been determined. In connection with malarial investigations on impounded waters in 1914–15 opportunities were afforded to determine how far from known breeding places anopheles could be found. Numerous inspections of the interiors of buildings indicated that Anopheles quadrimaculatus was very rarely present more than a mile from the breeding area, even though the latter was very prolific. This species was never found in houses and barns located at distances of 1¼ miles and more from the most prolific breeding places. Persons living 1½ miles from such areas reported an entire absence of mosquitoes.. The experiments were planned on the same lines as those carried out with the flight of a Panama species, Anopheles tarsimaculata, at Gatun. Accordingly a number of Anopheles quadrimaculata were captured alive for the test, the sources from which they were taken and the methods of capture being as follows: (1) Mosquito nets were placed close to the breeding places at night and the anopheles were attracted into the nets by men who served as bait. The anopheles were stained in the nets by spraying with a 1 per cent. aqueous solution of eosin (yellowish) from an atomizer and liberated. (2) Resting anopheles were caught in heavily infested houses in the daytime by means of a hand-collecting device. The mosquitoes were taken to a point in the breeding area which had been selected as a liberation station. They were then stained as above described and allowed to escape. On the first day only a few were set free, but on the second day a large number was liberated, all at one point. The author concludes that the flight of Anopheles quadrimaculatus in nature extends to approximately a mile from a breeding place producing very profusely. Beyond this distance stained specimens were not found. The distance of flight from a place producing very freely, but less profusely than some, was approximately a half-mile. Stained specimens of Anopheles quadrimaculatus were taken as follows: 1 at 5565 feet from the point of liberation; 2 at 3245 feet; 3 at 3090 feet; 1 at 2800 feet. Anopheles quadrimaculatus in one test flew across a river 800 feet wide in returning to a plantation from which they were originally caught for the test. Approximately 900 to 1000 mosquitoes were liberated.

Drinking Fountains.—Whittaker (*U. S. Public Health Reports*, May 11, 1917) investigated 77 drinking fountains in use at the University of Minnesota. These fountains represented fifteen different types, all of which were found to be improperly constructed to prevent them from contamination by the consumer. The bacteriological examinations conducted on these fountains showed that 80 per cent. of these fountains contained streptococci when they were not found present in the water supplied to the fountains. These results indicate that drinking fountains may be a factor in the transmission of communicable diseases, a condition which should be remedied. Experiments were conducted with various types of fountains to supplant those in use and a type was designed which is stated to be both economical and safe from a sanitary point of view. It was found necessary, in a practical design, to entirely protect the point of discharge and to guard the nozzle against the approach of the consumer. The nozzle in this design fulfils these requirements and can be substituted for the nozzle used on practically any of the common types of drinking fountains. This type of nozzle protects the point of discharge by enclosing the small discharge tube in a larger tube, which is cut at an angle, with its upper surface extending beyond the outer extremity of the inner tube. The wire muzzle prevents the consumer from approaching the point of discharge. This nozzle can be used on the constant or intermittent flow type. In cases in which the water-pressure varies to a large degree pressure regulators should be installed. Doubtless there are many other mechanical possibilities of accomplishing the same result, but the one designed is simple and inexpensive and it can be attached to practically any fountain.

Anopheles Punctipennis; a Note on its Ability to Serve as a Host for Plasmodium Falciparum.—Mitzmain (*U. S. Public Health Reports*, July 6, 1917, p. 1081) states that the experimental determination of the role of Anopheles punctipennis as a potential host for the common forms of malaria has been established, as ascertained by King. No additional findings have been developed whereby previously reported negative results with this anopheline and Plasmodium falciparum might be accounted for. In the present series 52 specimens of Anopheles punctipennis were fed upon the blood of cases of subtertian malaria, and 14 infections resulted. Of 8 specimens of Anopheles quadrimaculatus, used as controls under identical conditions, 4 became infected. Anopheles punctipennis, while highly susceptible to infection with Plasmodium vivax, exhibits no special predilection toward this species, but it has been shown to be a sufficiently receptive host of Plasmodium falciparum to be held of sanitary importance. From the writings of Beyer and his co-workers, Craig and others it has been concluded that a specific relation exists between American anophelines and the several varieties of malaria. The transmission of tertian and quartan malaria has been held to be effected by Anopheles quadrimaculatus, while to Anopheles crucians has been ascribed the incidence of subtertian malaria. Craig concluded that: "The observations noted explain clearly why certain localities suffer more severely than others from certain types of malarial infections. Given a locality in which only Anopheles crucians occurred and we could have nothing but estivo-autumnal infections; but if Anopheles quadrimaculatus were the only anopheles present we might have either tertian or quartan infections but no estivo-autumnal malaria." The present status of the common American anophelines with reference to their susceptibility to infection with the several species of malarial parasites is as follows: Anopheles quadrimaculatus may serve as a host for all three parasites of malaria. Anopheles punctipennis and Anopheles crucians are susceptible to infection with Plasmodium vivax and Plasmodium falciparum.

Intravenous Injection of Typhoid Vaccine.—Kibler and McBride (*Jour. Infect. Dis.*, July, 1917, p. 13) found that the immediate results of the intravenous injection of typhoid vaccine, such as chill, rise and fall of temperature leukocytosis, and changes in the concentration of agglutinin and opsonin, usually in the direction of an increase, were the same in the normal man as in the typhoid patient, and the results do not support the view that the reaction is essentially specific. Except insofar as the results show that leukocytosis is rather constant after the injection of vaccine they do not appear to support any particular view advanced to explain the action of intravenous injection of foreign protein in infectious diseases. The number of cases observed by us is too small to allow any conclusions as to the therapeutic effect of typhoid vaccine in typhoid fever, but the results obtained would seem to correspond fairly well with the results obtained in larger series.

Plea for Greater Care in the Performance of Duty by Medical Officers at Recruiting Stations.—FARENHOLT (*U. S. Naval Medical Bull.*, July, 1917, p. 318) states that the examiner should regard his duties most seriously, should strive to develop a nicer sense of observation, remembering that a compromise with established physical standards can only result disastrously, and he should adopt for the examining room the motto, "Quality, not quantity."

The Etiology of Common Colds.—FOSTER (*Jour. Infect. Dis.*, November, 1917, p. 451) concludes from his experiments that the following facts have been established: Common colds of the ordinary type are infectious. The ordinary bacteriological methods that have been resorted to heretofore do not furnish reliable criteria on which to base conclusions as to the etiology of these affections. Cultures made from the nasal secretions early in the acute phase often remain sterile, while cultures made later in the attack frequently show such a diversity of organisms that only presumptive evidence exists for ascribing to anyone an etiological role. It has been demonstrated experimentally that the virus of common colds occurs in the nasal secretions and that this virus is capable of passing through Berkefeld filters, which are impermeable to ordinary bacteria. By the employment of special anaërobic methods the virus of common colds has been cultivated *in vitro* and has proved capable of repeated recultivation in subcultures. Experimental inoculations have demonstrated that Berkefeld N filtrates of subcultures of the virus, in the second generation at least, are infective. A peculiar minute microörganism has been isolated from cultures made from the filtered nasal secretions in common colds. This microörganism can be passed through Berkefeld N filters and has been recultivated from culture filtrates. Although conclusive proof of its nature has not been adduced the experiments suggest that the microorganism described bears a definite relation to the true infective agent.

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